

REMARKS

Reconsideration of the application is requested.

Claims 1-12 remain in the application. Claims 1-8 are subject to examination and claims 9-12 have been withdrawn from examination.

In item 2 on pages 2-3 of the above-identified Office Action, claims 1-2 and 5-8 have been rejected as being obvious over U.S. Patent No. 6,094,305 to Shiraishi (hereinafter Shiraishi) in view of U.S. Patent No. 5,673,103 to Inoue et al. (hereinafter Inoue) under 35 U.S.C. § 103.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and, therefore, the claims have not been amended to overcome the references.

The invention of the instant application relates to a method for characterizing an illumination source in an exposure apparatus. A mask dedicated for performing the characterization is introduced into a mask mount of the exposure apparatus. According to the invention, the mask has a front surface with an opaque layer (double slit) that faces the illumination source. During illumination, an interference pattern is imaged on a rear surface being formed by the

transparent mask substrate. This image is transferred with considerable contrast through the objective lens into a substrate plane. The image profile resulting in the substrate plane is analyzed to obtain a light distribution representative of the illumination source width and extent.

Shiraishi shows an exposure method using a reticle 11 with a pattern of alternate transmission portions 12a, 12b. As described on column 9, lines 61 to 64, the alternate transmission portions are formed as bare surface portions 12a and phase shift transmission portions 12b. Accordingly, Shiraishi does not provide an opaque layer having two mutually parallel slits separated from one another by a distance being disposed in the opaque layer as recited in claim 1 of the instant application.

Furthermore, Shiraishi shows that the mask has the phase shift pattern oriented such that the pattern does not face the illumination source. In contrast, claim 1 of the instant application recites that opaque layer of the mask faces the illumination source.

As indicated by the Examiner, Shiraishi does not show an opaque layer being formed on the front which faces the illumination source. For this feature, the Examiner relies on the Inoue reference.

Inoue teaches an exposure apparatus for projecting a pattern of a photo mask 21 onto a substrate. The photo mask includes one-dimensional grating patterns 22 being formed on the mask 21 in the vertical and horizontal directions. In addition, an analyzer 24 is formed on or near the grating patterns 22 and is capable of transmitting only a light component of exposure light which has a predetermined direction of polarization.

As shown in Figs. 13A-13D of Inoue, the grating patterns 22 are formed on a rear surface, i.e. facing the substrate. Column 13, lines 1 to 9, explicitly states that "the analyzer 24 may be formed on the light-shielding film of the mask, as shown in Fig. 13A, or may be formed on the lower surface of the mask, as shown in Fig. 13B".

Accordingly, Inoue teaches to place the analyzer on a front surface facing the illumination source. The analyzer 24, however, does not constitute an opaque layer having two mutually parallel slits as recited in claim 1 of the instant application. In contrast, the analyzer 24 transmits a light component having a predetermined direction of polarization but does not serve as an opaque layer and therefore cannot read on this limitation recited in claim 1 of the instant application.

In items 3 and 4 on pages 3 and 4 of the above-identified Office Action, claims 3 and 4 have been rejected as being obvious over Shiraichi in view of Inoue and further in view of U.S. Patent No. 4,885,232 to Spak (hereinafter Spak) or U.S. Patent No. 6,699,628 to Shima (hereinafter Shima) under 35 U.S.C. § 103.

As Shima and Spak also fail to show the feature of the mask being reversed in the mask mount, the subject matter according to the invention is considered new and inventive over Shima and Spak as recited in claim 1 of the instant application. In other words, claim 1 is believed to be allowable, and as claims 3 and 4 depend on claim 1, they are also believed to be allowable.

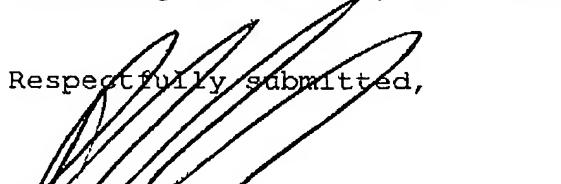
It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1.

In view of the foregoing, reconsideration and allowance of claims 1-12 are solicited.

If an extension of time is required, petition for extension is herewith made. Any extension fee associated therewith should be charged to the Deposit Account of Lerner Greenberg Stemmer LLP, No. 12-1099.

Please charge any other fees that might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner Greenberg Stemmer LLP, No. 12-1099.

Respectfully submitted,

  
Ralph E. Loosner  
USPTO Reg. No. 41,947

November 28, 2006

Lerner Greenberg Stemmer LLP  
P.O. Box 2480  
Hollywood, Florida 33022-2480  
Tel.: (954) 925-1100  
Fax: (954) 925-1101